THE COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

Our Ref: SJ-10317US
DATE: November 20, 1998

Dear Sir:

Transmitted herewith for filing is the patent application papers for the following application

Inventor: Manfred A. A. Lupke and Stefan A. Lupke
Title: PIPE WITH COUPLING CONFORMING TO PIPE DIAMETER

Enclosed are:

(x) 6 sheet(s) of drawings.

(x) Petition, Declaration, Specification

( ) Assignment of invention to

(x) A verified statement to establish small entity status under 37 C.F.R. 1.9 and 37 C.F.R. 1.27

THE FILING FEE HAS BEEN CALCULATED AS SHOWN BELOW:

For	(Col. 1) No. Filed	(Col. 2) No. Extra
Basic Fee		
Total Claims	11 - 20	0
Indep. Claims	5 - 3	2
( )Multiple dependent claims presented		

*If the diffirence in column 1 is less than zero, enter "0" in Col. 2

Small Entity RATE	FEE		Other than a Small Entity RATE	FEE
	$395.00	OR		$ .00
x =	$. 00	OR	x 14=	$
2x 41.00	$ 82.00	OR	x 64=	$
+ =	$	OR	+210=	$
TOTAL	$477.00.	OR	TOTAL	$.00

( ) Please charge my Deposit Account No. 040752 in the amount of $ .00, a duplicate copy of this sheet is enclosed.

(X) A cheque in the amount of $477.00 is enclosed to cover the filing fee.

(X) The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. 040752. A duplicate copy of this sheet is enclosed.

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( ) The Commissioner is hereby authorized to charge payment of the following fees during the pendency of this application or credit any overpayment to Deposit Account No. 040752. A duplicate copy of this sheet is enclosed.

( ) Any patent application processing fees under 37 C.F.R. 1.17
( ) The issue fee set in 37 C.F.R. 1.18 at or before mailing of the Notice of Allowance, Pursuant to 37 C.F.R. 1.311 (b).
( ) Any filing fees under 37 C.F.R. 1.6 for presentation of extra claims.

Respectfully submitted,

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Applicant or Patentee: Manfred A. A. Lupke and Stefan A. Lupke

Attorney's Docket No. SJ-10317US

Serial or Patent No.: _____

Filed or Issued: _____

For: **PIPE WITH COUPLING CONFORMING TO PIPE DIAMETER**

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY
STATUS [37 CFR 1.9(f) AND 1.27(b)] - INDEPENDENT INVENTOR

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled; PIPE WITH COUPLING CONFORMING TO PIPE DIAMETER described in:

[X] the specification filed herewith
[ ] application serial no.: _____, filed _____
[ ] patent no.: _____, issued _____
[ ] was filed as PCT International Application No. _____
on _____ and was amended
under PCT Article _____ on _____

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed or licensed or am under an obligation under contract or law to assign, grant, convey or license any rights in the invention is listed below:

[x] no such person, concern or organization
[ ] persons, concerns or organizations listed below*

* NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

FULL NAME: _____

ADDRESS: _____

_____

.../2

[ ] INDIVIDUAL
[ ] SMALL BUSINESS CONCERN
[ ] NONPROFIT ORGANIZATION

FULL NAME: _____

ADDRESS: _____

_____

[ ] INDIVIDUAL
[ ] SMALL BUSINESS CONCERN
[ ] NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. [37 CFR 1.28(b)]

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

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_____ november 16, 1998.
Signature Date

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_____ november 16, 1998
Signature Date

TITLE: PIPE WITH COUPLING CONFORMING TO PIPE DIAMETER

FIELD OF THE INVENTION

The present invention relates to the making of couplers in plastic pipes.

BACKGROUND OF THE INVENTION

Plastic pipes are built with belled ends for coupling with other pipes. Conventionally, these belled ends are of a larger diameter than the remainder of the pipe. This presents a problem with respect to shipping and storage of the pipes because spacers are needed between the pipes. Without these spacers, the enlarged coupling bell of each pipe is exposed to the weight of all of the pipes around it. This can easily cause damage to the bells by weakening, deforming and even cracking of the bells making them ineffective in providing a sealed coupling between the pipes.

SUMMARY OF THE PRESENT INVENTION

The present invention relates to a plastic pipe from which pipe sections having male and female coupling ends are made. According to the present invention, the female coupling end, i.e. the coupling bell is consistent in diameter with the main body of the pipe. As such, when the pipe is loaded with other similar pipes without using spacers between the pipes most of the load is taken up by the pipe body rather than the coupling bell of the pipe.

In particular, a plastic pipe made in accordance with the present invention has a multiple layer wall construction comprising major wall portions which are formed with first corrugations. These major wall portions are separated from one another by minor wall portions

formed with second corrugations and also formed with a bowed wall part. The second corrugations are smaller in diameter than both the first corrugations and the bowed wall part. The bowed wall part is consistent in diameter with the first corrugations.

A plastic pipe made with the above wall construction is used for forming coupleable pipe sections. This is achieved by removing a transition piece of the bowed wall part to the second corrugations. This produces a first pipe section having a coupling bell converted from the bowed wall part and a second pipe section having a male spigot formed by the second corrugations of the pipe. The male spigot fits into the bell for coupling the two pipe sections with one another.

BRIEF DESCRIPTION OF THE DRAWINGS

The above as well as other advantages and features of the present invention will be described in greater detail according to the preferred embodiments of the present invention in which;

Figure 1 is a sectional view through a pipe wall construction according to a preferred embodiment of the present invention;

Figure 1A shows an enlargement of part of the pipe wall construction of Figure 1;

Figures 2 through 4 show various stages of preparing the pipe wall construction of Figure 1 to produce coupled pipe sections;

Figure 5 is a sectional view through a pipe wall construction according to a further preferred embodiment of the present invention;

Figures 6 through 9 show the different method steps of preparing the pipe wall construction of Figure 5 to produce coupled pipe section.

DETAILED DESCRIPTION ACCORDING TO THE PREFERRED EMBODIMENTS OF THE PRESENT INVENTION IN WHICH:

Figure 1 shows a pipe wall construction generally indicated at 1. This pipe wall construction is formed from a common source of plastic separated into different streams through an extrusion process as is known in the art. However, unlike conventional practice these two streams of plastic are brought together to form the unique configuration of the pipe wall construction of Figure 1.

More specifically, and as better seen in Figure 1A the wall construction comprises an inner pipe wall 3 formed from the first stream of plastic and an outer pipe wall 5 formed from the second stream of plastic. The inner pipe wall is flat except where the pipe wall is formed with a bowed wall part 9. The outer pipe wall is formed with a series of corrugations except at the bowed wall part 9 where the inner and outer pipe walls conform with one another.

As noted above, the outer pipe wall is formed into corrugations. However, these corrugations vary in diameter lengthwise of the pipe. Specifically, along major portions 7 of the length of the pipe, the outer wall is formed into corrugations 8 and along minor portions 13 of the length of the pipe, the outer wall is formed into corrugations 14. These minor portions 13 of the pipe wall also include the bowed wall part 9.

Figure 1 best shows how the major portions 7 provided with corrugations 8 dominate the length of the pipe relative to the intervening minor pipe wall portions 13 comprising bowed wall part 9 and corrugations 14.

In Figure 1A it will be seen that although corrugations 8 have a larger diameter than the corrugations 14, the corrugations 14 have a greater wall thickness. This is because both corrugations are made with the same amount of plastic material.

Bowed wall part 9 has a transition area 11 where it meets with the small diameter corrugations 14. The removal of this transition area produces two separate pipe sections having end wall constructions as shown in Figures 2 and 3. The wall construction of Figure 2 terminates in a bell 9a which has been converted from the bowed wall part 9 through the removal of the transition area 11 of the bowed wall part. This transition region removal also produces a male spigot end wall construction as shown in Figure 3 where the spigot is formed by the small diameter corrugations 14. Figure 4 of the drawings shows that a seal 15 is placed into one of the valleys of the corrugations 14. The bell 9a of the pipe wall section of Figure 2 is then slid over the spigot forming corrugations 14 of the pipe wall end of Figure 3. This produces a sealed coupling of the two pipe ends relative to one another. The increased wall thickness of the spigot forming corrugations makes them strong to maintain the seal in the coupling.

Figure 4 clearly shows that the bell 9a is of a height or diameter consistent with that of the corrugations 8. This produces two benefits. Firstly, the bell on the pipe does not protrude outwardly relative to the major portions of the pipe wall and as such is not subject to localized pressure which would be experienced by larger bells on conventional pipes during shipping and storage. As such, the bell 9a maintains its circular configuration around the pipe and is very effective in providing a sealed pipe coupling.

Secondly, the coupled regions of joined pipe sections are of a consistent diameter with the rest of the pipe. This is important for a number of reasons such as for example the feeding of the pipe into relatively tight spaces. In such a situation the size of the opening is not dictated by an enlarged coupling as is the case in prior art constructions.

Another benefit of making a pipe wall construction with first corrugations, second smaller diameter corrugations and a bowed wall part consistent in diameter with the first corrugations, is that such a wall construction can be used to make a triple wall pipe as shown in Figure 5 of the drawings.

The triple wall pipe is in its first stages of formation made in exactly the same manner as the double wall pipe of Figure 1, i.e. two streams of plastic are extruded with one another to form a pipe wall having major pipe wall portions formed with corrugations 8a and separated by minor pipe wall portions comprising corrugations 14a and a bowed wall part 9a. Corrugations 14a are again smaller in diameter than but of increased wall thickness relative to corrugations 8a.

After the two streams of plastic have been formed into a double wall pipe as described immediately above, it is fitted within a plastic sheath or layer 15. This sheath is only very slightly greater in diameter than the corrugations 8a and the bowed wall part 9a. The sheath as shown is however substantially greater in diameter than the corrugations 14a.

The outer sheath is preferably applied by a cross head and the entire pipe comprising all three layers is put through a vacuum sizing tank. This sets the outside shim of the sheath where it attaches to the corrugations 8a and the bowed wall part 9a. The sheath and the corrugations

14a do not attach to one another as shown in Figure 5.

The triple wall pipe has a transition area defined by the lines 17 and 19 in Figure 5. By removing this transition area, two separate pipe sections shown in Figures 6 and 7 are produced. The pipe section of Figure 6 terminates with a belled end 10a which comprises the portion of the bowed wall part 9a remaining after the transition region has been removed and the sheath 15 covering that remaining bowed wall part.

The end wall region of the pipe section shown in Figure 7 comprises corrugations 14a and a sheath portion 15a spaced outwardly of the corrugations. Figure 8 of the drawings shows that in preparing a male spigot coupler, sheath portion 15a is removed from the pipe end to uncover corrugations 14a.

Figure 9 of the drawings shows the coupling of the bell 10a with the spigot forming corrugations 14a. Prior to making this coupling, a flexible O-ring seal 21 is inserted into one of the valleys of the corrugations 14a to provide an effective seal for the coupling.

The description above relates to a female bell on one end of the pipe section and a male spigot on one end of the another pipe section. As will be appreciated, an individual pipe section according to the present invention has these male and female coupling parts at its opposite ends.

Although various preferred embodiments of the present invention have been described in detail, it will be appreciated by those skilled in the art that variations may be made without departing from the spirit of the invention or the scope of the appended claims.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A plastic pipe having a multiple layer wall construction comprising major wall portions which are formed with first corrugations and which are separated from one another by minor wall portions formed with second corrugations and also formed with a bowed wall part, said second corrugations being smaller in diameter than both said first corrugations and said bowed wall part and said bowed wall part being of a diameter consistent with that of said first corrugations.

2. A plastic pipe as claimed in Claim 1 including first, second and third layers in said multiple layer wall construction, said third layer being provided outwardly over and adhered to said first corrugations and said bowed wall part and being spaced outwardly of said second corrugations.

3. A plastic pipe having a multiple layer wall construction with a coupling end for coupling with another pipe, said wall construction including a plurality of corrugations, said coupling end comprising an open ended bell having a diameter consistent with that of said corrugations.

4. A plastic pipe having a multiple layer wall construction including a coupling end for coupling with another pipe, said wall construction being formed with first and second corrugations, said first corrugations being provided over most of the pipe, said second corrugations being provided at the coupling end of the pipe and being smaller in diameter than said first corrugations.

5. A plastic pipe having a multiple layer wall

construction with first and second coupling ends for coupling to other pipes, said wall construction being formed with first corrugations, second corrugations and an open ended bell, said first corrugations being provided along most of said pipe, said second corrugations being provided at said first coupling end and being smaller in diameter than said first corrugations, said bell being provided at said second coupling end and being of a diameter consistent with that of said first corrugations.

6. A plastic pipe as claimed in Claim 5, including first, second and third layers in said wall construction, said third layer being adhered to said first corrugations and said bell while being spaced from said second corrugations.

7. A method of making a plastic pipe comprising extruding first and second streams of plastic into a mold to provide said pipe with a multiple layer wall construction, forming first corrugations along major portions of said wall construction and forming second corrugations and a bowed wall region along minor portions of said wall construction between said major portions thereof, said first corrugations and said bowed wall part being consistent in diameter, said second corrugations having a diameter less than that of said first corrugations and said bowed wall part.

8. A method as claimed in Claim 7, wherein said bowed wall region has one end forming a transition wall part to said second corrugations, said method including removing said transition wall part to form first and second pipe sections from said pipe in which said bowed wall region is converted to an open ended bell on said first pipe section and said second corrugations from a male spigot on said second pipe section, said bell and said spigot being inter-

fittable with one another for coupling said first pipe section with said second pipe section.

9. A method as claimed in Claim 7, including covering said wall construction with an external layer of plastic and then forcing said first corrugations and said bowed wall region of said wall construction and said layer of plastic to adhere to one another.

10. A method as claimed in Claim 9, including dividing said pipe into first and second pipe sections through said external layer and removing part of said bowed wall region of said wall construction to provide said first pipe section with a belled end covered by said external layer.

11. A method as claimed in Claim 10, including removing part of said external layer around and uncovering said second corrugations to form a spigot end on said second pipe section.

ABSTRACT OF THE DISCLOSURE

A plastic pipe has a multiple layer wall construction including major and minor wall portions. The major wall portions are formed with first corrugations and are separated from one another by the minor wall portions which are formed with second corrugations and a bowed wall part which is of the same diameter as the first corrugations. The second corrugations are smaller in diameter than both the first corrugations and the bowed wall pipe. The wall construction is cut at the bowed wall part to produce two pipe sections which couple with one another. One of those pipe sections has an open ended bell converted from the bowed wall pipe and the other pipe section has a male spigot formed by the second corrugations of the wall construction.

FIG1A

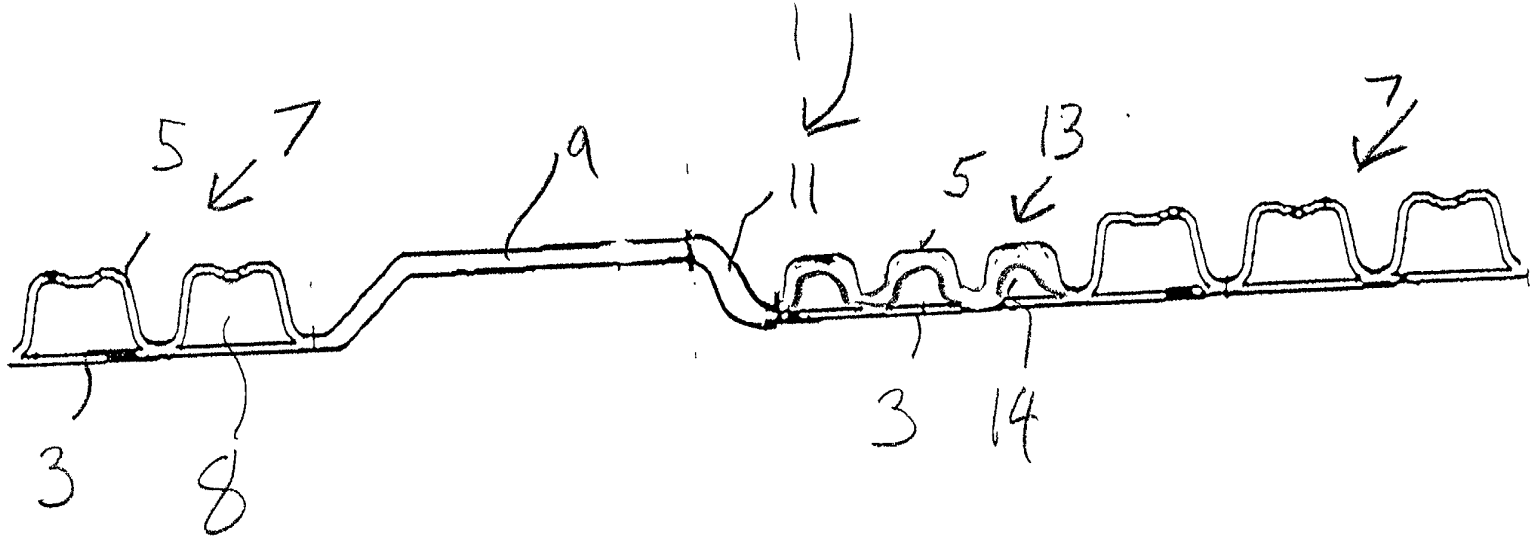
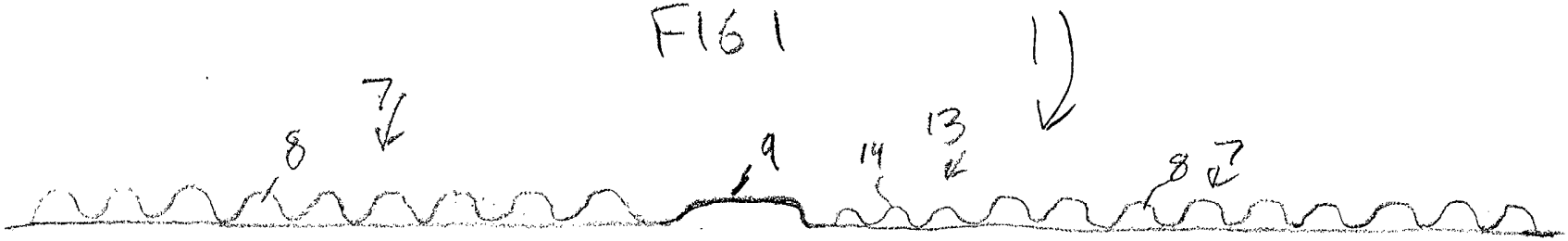


FIG1



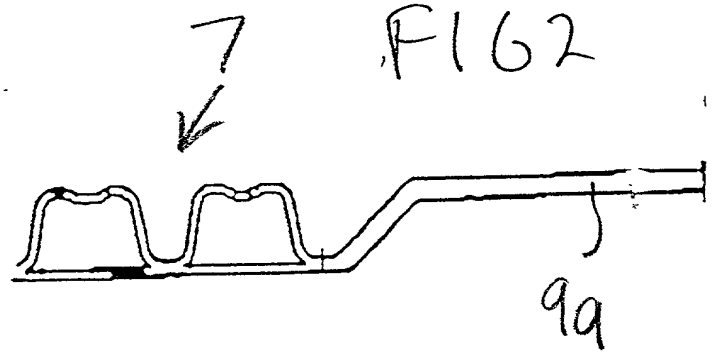


FIG 2

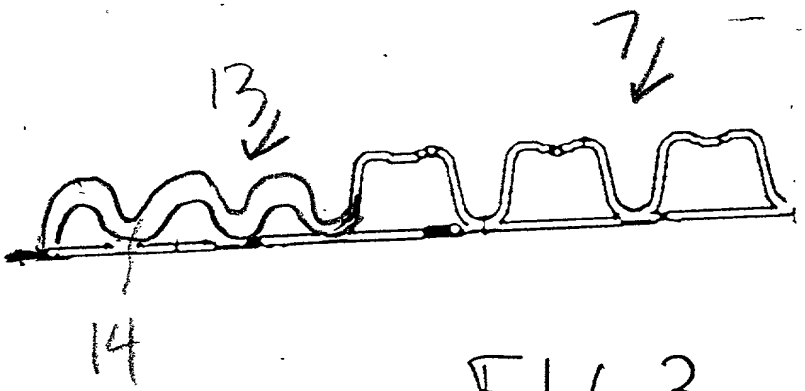


FIG 3

FIG 4

FIG5

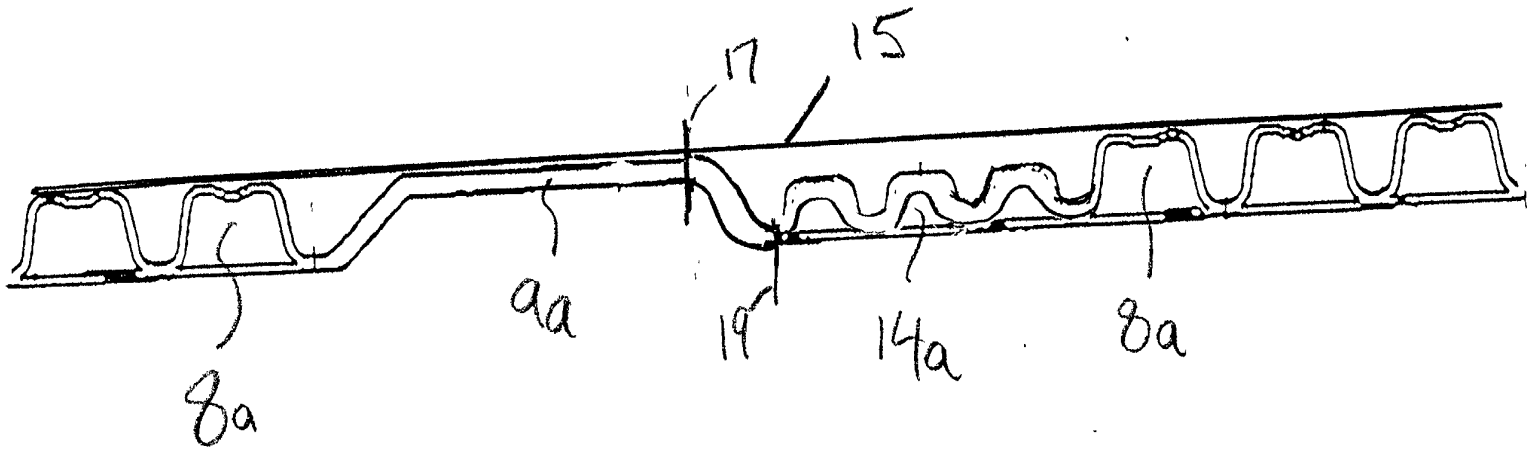


FIG 6

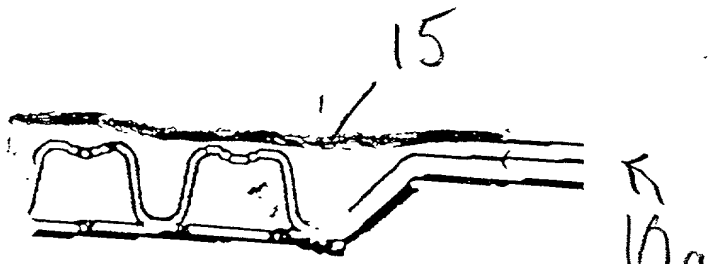


FIG 7

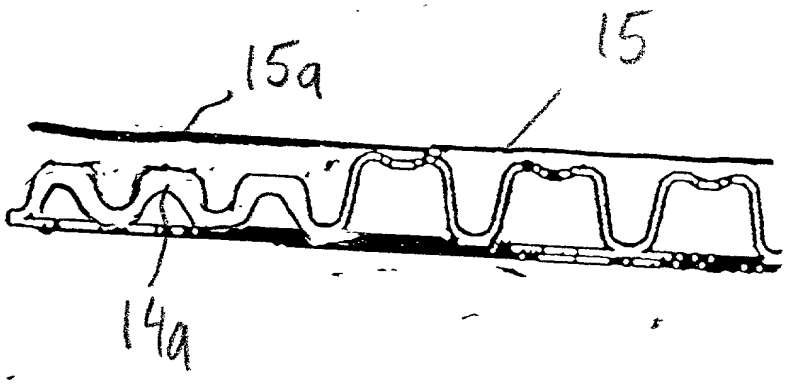


FIG 8

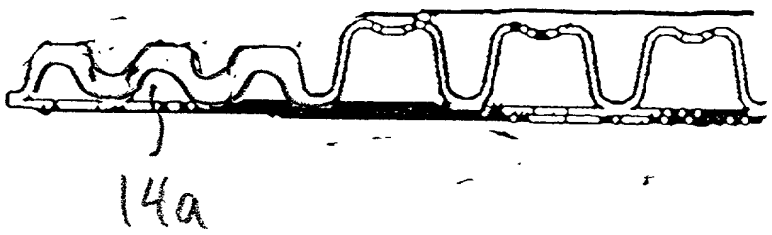
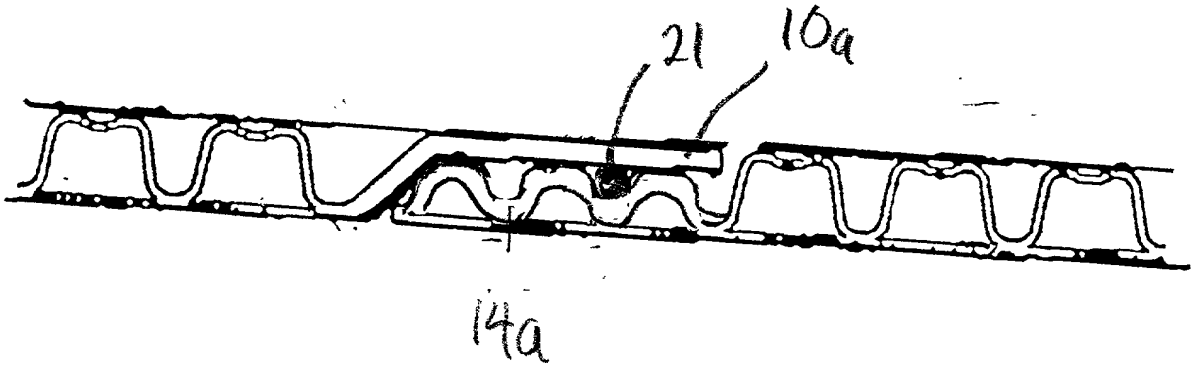


FIG 9



UNITED STATES

Petition, Declaration and Specification

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **PIPE WITH COUPLING CONFORMING TO PIPE DIAMETER** the specification of which

(X) is attached hereto.

( ) was filed on _____ as Application Serial No. _____ and was amended on _____ (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s):			Priority Claimed	
(number)	(country)	(date filed)	( ) yes	( ) no
(number)	(country)	(date filed)	( ) yes	( ) no
(number)	(country)	(date filed)	( ) yes	( ) no

.../2

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose material information as defined by Title 37, Code of Federal Regulations, Section 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Appln. Serial No.)	(Filing Date)	(Status: patented, pending, abandoned)

And we hereby appoint the following as our attorneys or agents to prosecute this application and to transact all business in the Patent Office connected therewith:

Douglas S. Johnson, Registration No. 15,945;
S. Warren Hall, Registration No. 30,350;
John C. Jeffrey, Registration No. 35,764; and
Frank P. Farfan, Registration No. 35,773

all of 133 Richmond Street West, Toronto, Ontario, Canada, M5H 2L7.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willfull false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Inventor's signature _____ Date: November 16, 1998.
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